

# NASA TECH BRIEF



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## Detonation Hazards with "Safe" Industrial Solvents

Minimum Impact Sensitivity Height, Inches (5-Pound Ball)

Solvent	Metal									
	Al Powder	Mg Powder	Ti Powder	Ba Shavings	Li Shavings	Be Powder	BeH <sub>2</sub> Powder	Al Filings	Mg Filings	B Powder
Freon MF	F, 50	0	0	X, 20 F, 15	X, 50 F, 40	0	0	0	0	0
Freon TF	F, 50	0	F, 50	X, 10 F, 4	X, 20	0	0	0	0	0
Carbon Tetrachloride	X, 50	F, 50	0	X, 15 F, 10	X, 18	F, 50	0	0	0	0
Trichloroethylene	0	F, 50	F, 50	X, 15 F, 13	X, 25	F, 50	0	0	0	0
Perchloroethylene	0	0	0	X, 20 F, 15	X, 30	0	0	0	0	0
1,1,1 Trichloroethane (Methyl Chloroform)	0	0	0	0	0	0	0	0	0	0

X, Number - Height in inches at which detonation occurred.

0 - No reaction at 50 inches.

F, Number - Height in inches at which flash or heavy sparking occurred.

Solvents which are normally considered safe have been found to present a potential hazard under certain conditions. A study has been performed to test whether a potential hazard existed in the handling of common powdered or granular metals in contact with a variety of commonly used halogenated solvents.

The sensitivities of various metal/halocarbon slurries to impact are shown in the Table. This information should be very useful in preventing accidental explosions due to improper handling of unstable materials in machine shops and in any other industries

which produce filings or require cleaning operations.

The test equipment employed included an impact sensitivity tester using a 5-lb steel ball dropped on a cup anvil containing the sample. Maximum drop height was 50 inches. One composition, a highly explosive mixture of RDX and TNT, was used as a reference material for these tests and showed a 50% probability of detonation at a drop height of eight inches. Barium and lithium shavings showed sensitivity with all of the halocarbons tested except methyl chloroform. Powdered aluminum, magnesium, titan-

(continued overleaf)

ium, and beryllium showed sensitivity with several halocarbons but generally required a higher level of initial energy.

**Notes:**

1. More tests should be performed to define adequately the limits and variables involved in this potential hazard. Wide dissemination of the data developed from such studies is necessary for the safety of the public, since these halogenated hydrocarbons are widely accepted throughout the industrial and consumer goods segments of the national economy.

2. Requests for further information may be directed to:

Technology Utilization Officer  
Langley Research Center  
Hampton, Virginia 23365  
Reference: B70-10404

**Patent status:**

No patent action is contemplated by NASA.

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